

THE EFFECT OF SOAP SPRAYS ON PLANTS*

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INTRODUCTION

Soaps in concentration of from 0.1 per cent to 0.5 per cent are at present widely used as spreading and wetting agents with contact poisons such as nicotine (4), pyrethrum (2), derris (3) and others. In concentrations of 1.0 per cent or stronger soap is sufficiently toxic to kill many soft bodied insects and their larvæ (1, 5). High kill of the Japanese beetle was also obtained with 1 per cent and 1.5 per cent soap solutions, as reported by van der Meulen and van Leeuwen (7) and others. Not all plants, however, can stand such high concentrations of soaps. It therefore became important to ascertain the maximum soap concentration that may be sprayed on different plants without injury. Since cocoanut oil soap has been shown to possess (6, 7) higher insecticidal properties than other soaps, potassium cocoanut oil soap was selected for testing. In addition to its higher toxic properties, cocoanut oil soap can be prepared in liquid form containing about 40 per cent actual soap and is readily soluble in cold water. These features make the soap more convenient to apply than the semi-solid soaps which require long standing or heating in order to dissolve in water.

EXPERIMENTAL

Some 54 different varieties including garden, orchard, greenhouse and ornamental plants were sprayed with aqueous solutions of 0.25, 0.5, 1.0 and 2.0 per cent cocoanut oil soap. The spray was applied with a 3 gallon knapsack sprayer. Observations were

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made within two weeks following the spray application. The tests on the outdoor plants were carried out between the 12 and 26 of August, 1932. During this period only two very light rainfalls occurred in the vicinity where the testing was conducted, giving a total precipitation of 0.34 inch. The foliage on the greenhouse plants was not syringed with water during the experiments.

The results, presented in tables 1 and 2 show that 0.25 per cent and 0.5 per cent soap produced no injury to any one of the plants tested; one per cent soap produced injury to 8 varieties of greenhouse plants, 7 varieties of garden plants but none to orchard trees; two per cent soap caused injury to most of the plants ranging from slight to severe.

Following these results it became of interest to study the effect of soap on blossoms. For this purpose 16 ornamental plants in full bloom were sprayed with 0.25 per cent and 0.5 per cent soap. The results in table 3 show that no injury resulted to the flowers

TABLE 1. TESTS WITH VARIOUS CONCENTRATIONS OF COCOANUT OIL SOAP ON GREENHOUSE PLANTS

Name of Plant	Injury from 0.25% & 0.5% Soap	Injury from 1% Soap	Injury from 2% Soap
Begonia	None	None	Slight injury to leaves.
Buddleia	"	Injury to young leaves.	Severe injury.
Crassula	"	None	None
Carnation	"	"	Injury to stems & leaves.
Chrysanthemum	"	"	None
Dracæna	"	"	"
Euphorbia	"	Injury to young leaves.	Severe injury.
English Ivy	"	Injury to young leaves.	Injury to leaves.
Fern (Boston)	"	Injury to leaves.	Severe injury to leaves.
Fern (Whitmanii)	"	Injury to leaves.	Severe injury to leaves.
Hydrangia	"	None	Slight injury.
Poinsettia	"	"	Severe injury.
Snapdragon	"	Injury to leaf tips.	" "
Stevia	"	None	None

of any one of the plants sprayed with 0.25 per cent, while injury occurred on several varieties from the 0.5 per cent solution.

It appears therefore that coconut oil soap in concentrations of 0.5 per cent or lower is practically safe to apply on all kinds of plants with the exception of delicate blossoms. When sprays of higher soap concentrations are required it becomes necessary to consider each variety separately, otherwise the less resistant plants may be injured.

TABLE 2. TESTS WITH VARIOUS CONCENTRATIONS OF COCOANUT OIL SOAP ON ORCHARD AND GARDEN PLANTS

Name of Plant	Injury from 0.25% & 0.5% Soap	Injury from 1% Soap	Injury from 2% Soap
Apple	None	None	None
Peach	"	"	Slight injury to foliage.
Cherry	"	"	Slight injury to foliage.
Grape	"	"	Appreciable inj- ury to shoots & foliage.
Beets	"	"	None
Cabbage (red)	"	"	"
Cabbage (green)	"	"	"
Kohl-rabi	"	"	"
Corn	"	"	"
Cucumber	"	"	"
Cantaloupe	"	"	"
Egg Plant	"	No injury.	Injury to blos- soms, none to leaves.
Lettuce	"	Injury to leaves.	Severe injury.
Lima Beans	"	None	None
Pumpkin	"	Injury to foliage.	Injury to foliage.
Blackberries	"	Injury to foliage & young shoots.	Injury to foliage & young shoots.
Sweet Potatoes	"	No injury.	Slight injury to foliage.
Squash	"	None	None
Rose	"	"	Injury to young leaves & flow- ers.
String Beans	"	Slight injury to young leaves.	
Sweet Peas	"	Slight injury to young leaves.	
Tomato (young plants)	"	None	Slight injury.
Tomato (plant in blos- som)	"	"	Injury to blos- soms.
Peppers	"	Injury to leaves.	Injury to leaves.

TABLE 3. TESTS WITH COCOANUT OIL SOAP ON FLOWERING PLANTS IN BLOOM

Name of Plant	Injury from 0.25% Soap	Injury from 0.5% Soap
Canna	None	None
Chrysanthemum, Hardy	"	"
Dahlia, Dwarf	"	"
Daisy	"	"
Delphinium	"	Injury to flowers.
Geranium	"	None
Geranium, Sweet	"	"
Heliotrope	"	"
Hollyhock	"	Injury to flowers.
Ice Plant	"	Injury to flowers.
Marigold	"	None
Petunia	"	Injury to flowers.
Phlox	"	None
Ragged Sailor	"	"
Roses	"	"
Gladiolus	"	Injury to flowers.

SUMMARY AND CONCLUSIONS

Greenhouse, garden, ornamental and orchard plants were sprayed with various concentrations of cocoonut oil soap in order to determine the maximum concentration that can be applied without injury. The results suggest the following conclusions.

1. Concentrations of 0.25 per cent soap caused no injury to blossoms or foliage of any one of the plants tested.

2. Concentrations of 0.5 per cent soap produced no injury to foliage, stems or buds but caused injury to delicate flowers.

3. Concentrations of 1.0 per cent soap produced no injury to orchard trees but produced injury to many greenhouse and garden plants.

4. Concentrations of 2.0 per cent soap produced injury to most of the plants tested.

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